Chapter 1: Current Surface Water Monitoring Program

Surface water monitoring programs which provided data used for the surface water assessments in this report are described briefly below and summarized on Table 1.1 below. Additional information regarding these monitoring programs is provided with each assessment. Further information may also be found in the Department's the 1998 New Jersey Water Quality Inventory Report and at the Division of Watershed Management's Water Monitoring Management Website: www.state.nj.us/dep/watershedmgt/allwmm.htm.

Surface Water Quality Monitoring

The NJDEP and USGS have cooperatively operated the Ambient Stream Monitoring Network (ASMN) since the early 1970's. This report provides the first assessment of quarterly data collected between 1995 and 1997 for conventional parameters, including total phosphorus, fecal coliform, dissolved oxygen, nitrate, pH and total suspended solids. In previous reports, each of the 81 stations was assumed to represent 5 miles. For this report, the assessment of spatial extent was based on the stream reach length in which the station occurred, using USEPA's Reach File 3 system (RF3).

These data were used to assess status with respect to applicable Surface Water Quality Standards at N.J.A.C. 7:9B. (NJDEP, 1998a) In addition, data were used to conduct several new assessments, including designated use assessments for drinking water, industrial and agricultural supplies. In addition, a USGS trends report based on ASMN data collected between 1986 and 1995 was used to evaluate threatened waters (i.e., waters which currently meet applicable Surface Water Quality Standards, but statistically significant adverse trends indicate that standards will not be met in two years). Assessments were conducted using methods recommended by EPA for Preparation of Water Quality Inventory Reports. (EPA, 1997). Metals and other toxics will be discussed in the 2002 Water Quality Inventory Report.

The Ambient Stream Monitoring Network was cooperatively redesigned by NJDEP and USGS in 1997; sample collection under the new design began in October, 1997. Only 1998 data had been published by USGS at the time this report was written. In addition, work has not been completed on a project with Rutgers University to develop a data analysis guidance manual to ensure appropriate statistical analyses of the data collected in the new design. Thus, the assessment of data from the redesigned ASMN has been deferred until the 2002 Water Quality Inventory Report.

River/Stream Benthic Macroinvertebrate Monitoring

NJDEP evaluates aquatic life designated use support in non-tidal rivers and streams using benthic macroinvertebrate monitoring. Benthic macroinvertebrate organisms, including crustacea, larval insects, snails and worms, are ubiquitous throughout the state’s streams and are an important component of the aquatic food web. Benthic macroinvertebrate communities are examined using USEPA's Rapid Bioassessment Protocols - Level II (see Plaftkin, et al, 1989; NJDEP, 1992). Using this protocol, communities are examined for pollution tolerant and intolerant forms and the results are used to compute the New Jersey Impairment Score (NJIS).

Using this scoring system, the benthic macroinvertebrate population results were used to identify aquatic life designated use support for rivers and streams.

Currently in New Jersey, monitoring occurs in the Ambient Biological Monitoring Network (AMNET) at over 800 locations statewide on a 5-year rotating schedule. Round 1 sampling was conducted between 1992 and 1996, inclusive. The resulting designated use assessment results were reported in the 1992, 1994, 1996 and 1998 305(b) Reports. Round 2 sampling (1997-2001) is now ongoing. For this 2000 Water Quality Inventory Report, published assessments for Round 2 are reported, but are limited to the Upper Delaware Basin (WMAs 1, 2 and 11) as sampled between 1997 and 1998 (see Fig. A3.1.2-2a contained in Chapter 3), representing 139 monitoring stations. Round 2 data collection for the remaining portions of the state will be completed in May of 2001 and final reports are planned to be published during 2002. Published Round 2 reports will be used in subsequent New Jersey Water Quality Inventory Reports. Readers are referred to the 1996 or 1998 305(b) Reports for the current status of statewide aquatic life assessment results based upon the first round of sampling.

In addition to direct biological assessments, the current round of field work includes a qualitative assessment of stream habitat quality at each monitoring location, the results of which are used to compute a Habitat Assessment Score. Various components of the habitat are examined such as the amount of available cover along the stream bottom, amount of sediment deposition, bank stability, frequency of riffles, presence and amount of riparian vegetative cover, etc. These data are published in concert with the corresponding biological assessments in the Department's AMNET reports.

Lake Monitoring: Fin-fish Assessments

The aquatic life use support assessment for lakes in this report are based upon warm water fishery assessments supplied by the Department's Bureau of Freshwater Fisheries (BFF). Assessments of lake fisheries are performed based upon a priority list provided in the Division of Fish and Wildlife's Warmwater Fisheries Management Plan (NJDEP, 1998b) a document which serves as the primary guidance for warmwater fisheries management for the Department. Lake assessment frequencies as performed by the BFF vary depending upon the lake in question and its individual management needs.

Fish populations are sampling using electrofishing (spring or fall), shoreline seining (summer to assess fish reproduction), and/or gillnetting (fall). In addition, basic water chemistry parameters such as dissolved oxygen, pH and nutrients are recorded during the summer months when the water columns are most stratified. Fish population data are then assessed by experienced fishery biologists for the purpose of determining a lake's actual or potential recreational value as a fishery with recommendations subsequently being made to maintain or enhance the resource.

It is important to note that although the Bureau of Freshwater Fisheries is principally concerned with the recreational value of the fisheries they assess, the assessments they provide are based upon the diversity of a wide range of fish species and not just species of recreational value. Many sport fish are carnivores who depend upon an abundant and diverse forage base to support

their populations. Hence, although many of these lakes are stocked, assessment results are not affected by the stocking.

For this 305(b) Report, assessments were supplied by BFF based upon fish inventories of selected lakes and reservoirs over 100 acres with public access for recreational fishing. This resulted in 10 lakes and reservoirs totaling 9,875 acres being assessed using data collected between 1993 to 2000. NJDEP plans to enhance the use of fisheries data for aquatic life assessments in future New Jersey Water Quality Inventory Reports.

Lake Monitoring: Eutrophication and Aesthetics

The Clean Lakes Program was designed by EPA to facilitate identification and remediation of impaired public lakes. Public lakes with water quality issues were identified by lake associations, municipalities or other entities; studies were conducted to characterize water quality and as funding was available, remediation projects were conducted. Also during the 1980's and early 1990's, NJDEP collected water quality data on a number of public lakes. Data collection included a suite of indicators such as total phosphorus, Secchi disk transparency and chlorophyll *a* levels to determine the trophic state of lakes. Much of the impairments brought to the Department's attention through the Clean Lakes Program centered around nuisance algal growth impairing swimming and in some cases boating.

To date the Clean Lakes Program has assessed a total of 116 public lakes representing 10,462 acres. This represents 31% of public lakes and 44% of public lake acres. Many Clean Lakes assessments had been performed in the 1980's and early 1990's. Clean Lakes Program data had been used in previous Water Quality Inventory Reports to assess lake Aquatic Life Designated Use Support. Beginning in this Report, Aquatic Life Use Support in lakes is based upon warm water fishery assessments supplied by the Department's Bureau of Freshwater Fisheries (described above).

Coastal Water Quality Monitoring Programs

Aquatic Life Assessments: Water column dissolved oxygen (DO) status was used as an indirect indicator for aquatic life designated use assessment within New Jersey's coastal waters for the first time in this report. In addition to carrying out the sanitary monitoring to assess the fitness of estuary waters for shellfish harvesting, the NJDEP's Bureau of Marine Monitoring collects quarterly data for DO, salinity, temperature, pH, suspended solids and nutrients at approximately 200 sites in New Jersey's estuarine and ocean waters through the Marine and Estuarine Water Quality Monitoring Program. DO data from the estuarine portions of the network not contained within waters assessed by the Delaware River Basin Commission in their 305(b) report were used to assess aquatic life assessment in estuarine waters presented in this report. This represents 170 sites (see Chapter 5 Appendix, Figure A5.1-1) using subsurface dissolved oxygen levels recorded between 1995 and June 1997.

Aquatic life assessment for ocean waters within New Jersey's jurisdiction is based upon water column dissolved oxygen (DO) levels recorded by the USEPA helicopter during June through September, 1995 through 1998. (USEPA, 1999). A series of 10 transects extend east along the

New Jersey coastline from Sandy Hook south to Cape May with samples taken at 1, 3, 5, 7, and 9 mile points along each transect. Samples are collected eight to ten times during the summer. At each site, two samples are collected, one at one meter below the surface and one at one meter above the ocean floor. Ocean depths ranged from 20 to 75 meters. For the purposes of this assessment only data from the 1 and 3 mile points were utilized (both surface and bottom) in order to limit the assessment to waters within New Jersey's three mile jurisdiction (see Chapter 5, Fig. A5.1).

Recreational Assessments: The Marine and Estuarine Water Quality Monitoring Program described above also includes fecal coliform data. These data were used to assess open marine and estuarine waters, using data collected between 1995-97. Cooperative Coastal Monitoring Program, jointly operated by the New Jersey Department of Health and Senior Services (NJDHSS) and NJDEP assesses water quality at bay and ocean bathing beaches. Data collected between 1995-99 were used for this report.

Shellfish Program Monitoring

The National Shellfish Sanitation Program (NSSP) collects data on the levels of fecal coliform in shellfish and waters that are harvested for shellfish. The Department monitors the sanitary quality of estuarine and ocean waters by observing measurements of coliform bacterial concentrations (indicators of the presence of pathogens) in the water column and uses the results to classify bay, estuarine and ocean waters for shellfish harvesting. Currently, about 2,500 stations are used to monitor 1,053 square miles of waters classified for shellfish harvest in the Shellfish Sanitation Program. These stations are sampled between five and twelve times each year for total coliform and fecal coliform bacteria. This network has not changed since the 1996 Water Quality Inventory Report.

Toxics in Fish Tissue

Fish and shellfish monitoring for assessing potential human health impacts and fish consumption advisories began in New Jersey as far back as 1976. Initial sampling locations were chosen to include all major drainages and areas where known or suspected sources of persistent bioaccumulative toxics (PBTs) might be found (e.g., PCBs, dioxin, pesticides, and mercury). These included freshwater, estuarine and marine areas important to both recreational and commercial fisheries. Subsequent monitoring activities were primarily research projects targeted at select species and drainages where contamination was found. Fishing advisories and sampling locations are routinely listed at the NJDEP Website (i.e., www.state.nj.us/dep/fgw) and in the New Jersey Fish and Wildlife Digests (NJDEP 2000a and NJDEP 2000b). Much of the data that was used to establish fish consumption advisories in New Jersey are over ten years old. Additional funding to address these data gaps and routinely update advisories (as needed) has not been available for several years. In fiscal year FY 1998 a one-time special NJ appropriation was established for NJDEP to study chemical contamination in the State's fisheries allowing both data sets to be selectively re-assessed via new research monitoring in FY1999 and FY2000. A more continuous, stable source of funding to maintain the State's monitoring of fish and waterways impacted by consumption advisories is currently under development.

Table 1.1: Monitoring and Assessment Summary

Assessment	Data Source for Assessment	Spatial Extent of Assessment	Time Period	Monitored/ Evaluated	Notes
Rivers and Streams					
Surface water quality	NJDEP-USGS Cooperative Ambient Stream Monitoring Network (ASMN)	Statewide	1995-97	Monitored	Trends from 1986-95 used to evaluate threats to water quality
Aquatic Life	NJDEP Ambient Biological Monitoring Network (AMNET)	Upper Delaware (WMAs 1, 2, 11)	1997-98	Monitored	Network is statewide; new data published on Upper Delaware WMAs
Recreation	ASMN - Fecal coliform data	Statewide	1995-97	Monitored	Trends from 1986-95
Drinking water	ASMN - nitrate data; finished drinking water quality	Statewide	1995-97	Monitored	Trends from 1986-95
Agriculture	ASMN - TDS, salinity, specific conductance	Statewide	1995-97	Monitored	
Industry	ASMN - pH, TSS	Statewide	1995-97	Monitored	
Lakes					
Aquatic Life	NJDEP Warmwater Fisheries Assessments	Selected lakes	1993-00	Monitored & Evaluated	Monitored: data after 1995
Recreation	NJDHSS & Local Health Dept lake beach monitoring	Statewide, all lake beaches	1999	Monitored	
Estuary and Ocean					
Aquatic Life	NJDEP Marine and Estuarine Water Quality Monitoring Program; USEPA Helicopter Program	All coastal waters	1995-97	Monitored	Based on Dissolved Oxygen; NJDEP: estuarine assessment; USEPA: ocean assessment
Recreation	NJDEP Coastal and Estuarine Monitoring Program; Cooperative Coastal Monitoring Program	All coastal waters	1995-99	Monitored	Coastal & Estuarine data: open waters; CCMP: bathing beaches
Shellfish Harvest	NJDEP Shellfish Sanitation Program	All coastal waters	1998-00	Monitored	Trends from 1976-00
All waters					
Fish Consumption	Issuance of fish consumption advisories or bans developed through research projects	Selected lakes, rivers and coastal waters	1976-98	Monitored & Evaluated	Monitored: advisories based on data less than 10 yrs old.